



- ☐ Tentative Specification
- ☐ Preliminary Specification
- ☒ Approval Specification

**MODEL NO.: V236H3**  
**SUFFIX: LS1**

**Customer:**

**APPROVED BY**

**SIGNATURE**

Name / Title \_\_\_\_\_

**Note**

\_\_\_\_\_  
Please return 1 copy for your confirmation with your signature and comments.

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**REVISION HISTORY**

| Version  | Date          | Page(New) | Section | Description                                            |
|----------|---------------|-----------|---------|--------------------------------------------------------|
| Ver. 0.0 | Sep. 24,2010  | All       | All     | The tentative specification was first issued.          |
| Ver.0.1  | Oct. 08,2010  | 5         | 1.1     | Interface is described with "4ch-LVDS"                 |
|          |               | 5         | 1.4     | Power consumption is modified                          |
|          |               | 9         | 3.1     | Power consumption and power supply current is modified |
|          |               | 14        | 4.1     | CNF1 and CN6 are modified                              |
|          |               | 18        | 5.1     | CN6 pin 5, 6 are modified                              |
|          |               | 25        | 6.1     | 3D Mode timing is changed                              |
|          |               |           |         | The preliminary specification was first issued         |
| Ver.1.0  | Oct. 13, 2010 | 6         | 1.5     | Update weight                                          |
|          |               | 12        | 3.2.1   | Add 3D converter design reference                      |
|          |               | 18        | 5.1     | Note (2)~(8) are modified                              |
|          |               | 26, 27    | 6.1     | Note (7) is added                                      |
|          |               |           |         | 100Hz timing is added                                  |
| Ver.2.0  | Nov. 11, 2010 | All       | All     | The Approval specification was first issued            |

## 1. GENERAL DESCRIPTION

### 1.1 OVERVIEW

V236H3-LS1 is a 23.6" TFT Liquid Crystal Display module with WLED Backlight unit and 4ch-LVDS interface. This module supports 1920 x 1080 Full HDTV format and can display up to 16.7M colors (6 bit +FRC). The converter module for Backlight unit is not built in.

### 1.2 FEATURES

- Extra-wide viewing angle.
- High contrast ratio.
- Fast response time.
- High color saturation.
- Full HD (1920 x 1080 pixels) resolution.
- DE (Data Enable) only mode.
- LVDS (Low Voltage Differential Signaling) interface.
- RoHS compliance.
- support 120Hz frame rate

### 1.3 APPLICATION

- Standard Living Room TVs
- MFM Application
- 3D Application

### 1.4 GENERAL SPECIFICATIONS

| Item                   | Specification                                                     | Unit  | Note |
|------------------------|-------------------------------------------------------------------|-------|------|
| Active Area            | 521.28(H) x 293.22(V) (23.547" diagonal)                          | mm    | (1)  |
| Bezel Opening Area     | 525.22 (H) x 297.22 (V)                                           | mm    |      |
| Driver Element         | a-si TFT active matrix                                            | -     | -    |
| Pixel Number           | 1920 x R.G.B. x 1080                                              | pixel | -    |
| Pixel Pitch(Sub Pixel) | 0.0905(H) x 0.2715(V)                                             | mm    | -    |
| Pixel Arrangement      | RGB vertical stripe                                               | -     | -    |
| Power consumption      | (23.23)W (LVDS input Power (9.4)W + LED Backlight Power (13.83)W) | Watt  | (2)  |
| Display Colors         | 16.7M                                                             | color | -    |
| Display Operation Mode | Transmissive mode / Normally white                                | -     | -    |
| Surface Treatment      | Anti-Glare coating (Haze 25%)                                     | -     | (3)  |

Note (1) Please refer to the attached drawings in chapter 9 for more information about the front and back outlines.

Note (2) Please refer sec 3.1 and 3.2 for more information of Power consumption

Note (3) The spec. of the surface treatment is temporarily for this phase. CMI reserves the rights to change this feature.

**1.5 MECHANICAL SPECIFICATIONS**

| Item        |                | Min.  | Typ.  | Max.  | Unit | Note |
|-------------|----------------|-------|-------|-------|------|------|
| Module Size | Horizontal (H) | 544.3 | 544.8 | 545.3 | mm   | (1)  |
|             | Vertical (V)   | 320.0 | 320.5 | 321.0 | mm   | (1)  |
|             | Depth (D)      | 14.1  | 14.6  | 15.1  | mm   | (1)  |
| Weight      |                | -     | 2550  | 2650  | g    | -    |

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

**2. ABSOLUTE MAXIMUM RATINGS****2.1 ABSOLUTE RATINGS OF ENVIRONMENT**

| Item                          | Symbol | Value |      | Unit | Note     |
|-------------------------------|--------|-------|------|------|----------|
|                               |        | Min.  | Max. |      |          |
| Storage Temperature           | TST    | -20   | +60  | °C   | (1)      |
| Operating Ambient Temperature | TOP    | 0     | 50   | °C   | (1), (2) |
| Shock (Non-Operating)         | SNOP   | -     | 50   | G    | (3), (5) |
| Vibration (Non-Operating)     | VNOP   | -     | 1.0  | G    | (4), (5) |

Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. ( $T_a \leq 40\text{ }^{\circ}\text{C}$ ).

(b) Wet-bulb temperature should be 39 °C Max. ( $T_a > 40\text{ }^{\circ}\text{C}$ ).

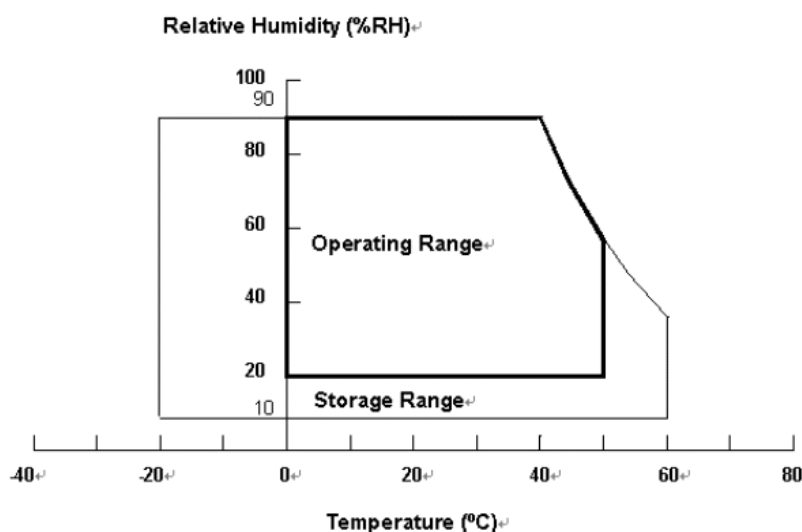
(c) No condensation.

Note (2) The maximum operating temperature is based on the test condition that the surface temperature of display area is less than or equal to 65 °C with LCD module alone in a temperature controlled chamber. Thermal management should be considered in final product design to prevent the surface temperature of display area from being over 65 °C. The range of operating temperature may degrade in case of improper thermal management in final product design.

Note (3) 11 ms, half sine wave, 1 time for  $\pm X$ ,  $\pm Y$ ,  $\pm Z$ .

Note (4) 10 ~ 300 Hz, 10 min, 1 time each X, Y, Z.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.



## 2.2 PACKAGE STORAGE

When storing modules as spares for a long time, the following precaution is necessary.

- Do not leave the module in high temperature, and high humidity for a long time, It is highly recommended to store the module with temperature from 0 to 35 °C at normal humidity without condensation.
- The module shall be stored in dark place. Do not store the TFT-LCD module in direct sunlight or fluorescent light.

## 2.3 ELECTRICAL ABSOLUTE RATINGS

### 2.3.1 TFT LCD MODULE

| Item                 | Symbol | Value |      | Unit | Note |
|----------------------|--------|-------|------|------|------|
|                      |        | Min.  | Max. |      |      |
| Power Supply Voltage | VCCI   | -0.3  | 12.6 | V    | (1)  |
| Logic Input Voltage  | VIN    | -0.3  | 3.6  | V    |      |

## 3. ELECTRICAL CHARACTERISTICS

### 3.1 TFT LCD MODULE

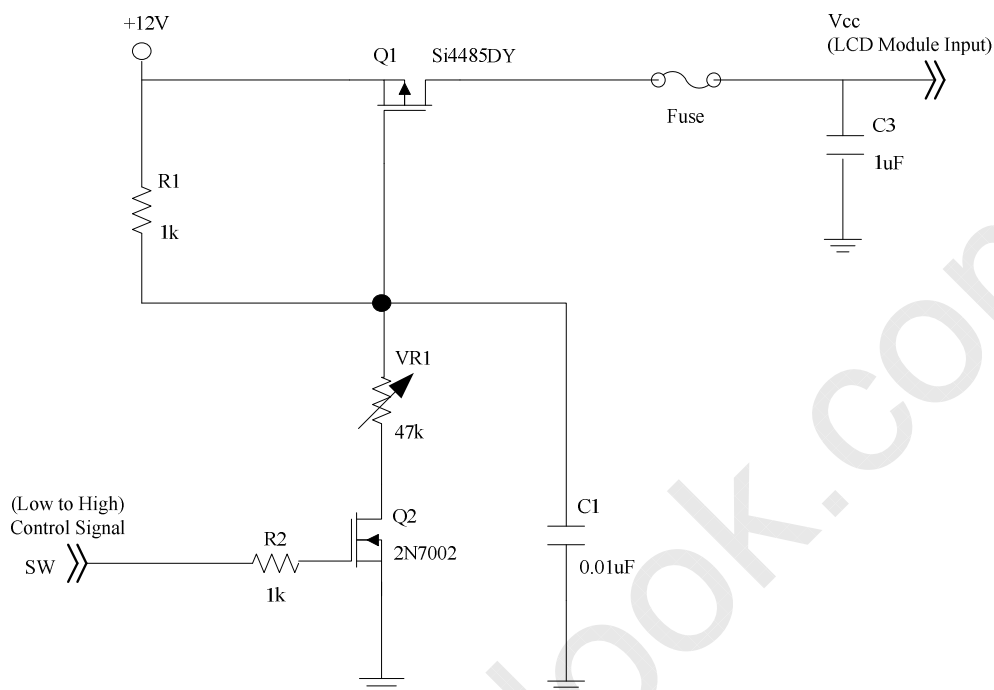
(Ta = 25 ± 2 °C)

| Parameter            |                                           | Symbol            | Value |      |      | Unit | Note |
|----------------------|-------------------------------------------|-------------------|-------|------|------|------|------|
|                      |                                           |                   | Min.  | Typ. | Max. |      |      |
| Power Supply Voltage |                                           | V <sub>CC</sub>   | 10.8  | 12   | 12.6 | V    | (1)  |
| Rush Current         |                                           | I <sub>RUSH</sub> | —     | —    | 3.8  | A    | (2)  |
| Power Consumption    | White Pattern                             | —                 | —     | 4.2  | 5.9  | W    | (3)  |
|                      | Horizontal Stripe                         | —                 | —     | 9.1  | 12.7 | W    |      |
|                      | Black Pattern                             | —                 | —     | 9.4  | 13.2 | W    |      |
| Power Supply Current | White Pattern                             | —                 | —     | 0.35 | 0.5  | A    |      |
|                      | Horizontal Stripe                         | —                 | —     | 0.76 | 1.06 | A    |      |
|                      | Black Pattern                             | —                 | —     | 0.78 | 1.1  | A    |      |
| LVDS interface       | Differential Input High Threshold Voltage | V <sub>LVTH</sub> | +100  | —    | —    | mV   | (4)  |
|                      | Differential Input Low Threshold Voltage  | V <sub>LVTL</sub> | —     | —    | -100 | mV   |      |
|                      | Common Input Voltage                      | V <sub>CM</sub>   | 1.0   | 1.2  | 1.4  | V    |      |
|                      | Differential input voltage (single-end)   | V <sub>ID</sub>   | 200   | —    | 600  | mV   |      |
|                      | Terminating Resistor                      | R <sub>T</sub>    | —     | 100  | —    | ohm  |      |
| CMIS interface       | Input High Threshold Voltage              | V <sub>IH</sub>   | 2.7   | —    | 3.3  | V    |      |
|                      | Input Low Threshold Voltage               | V <sub>IL</sub>   | 0     | —    | 0.7  | V    |      |

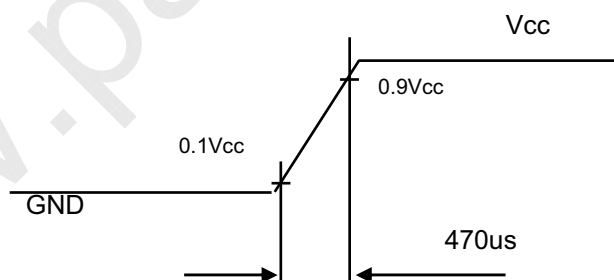


Note (1) The module should be always operated within the above ranges.

Note (2) Measurement condition:



**Vcc rising time is 470us**



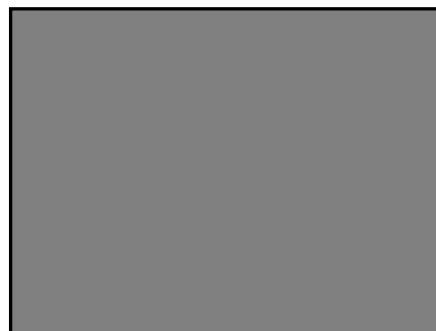
Note (3) The specified power consumption and power supply current is under the conditions at  $V_{CC} = 12\text{ V}$ ,  $T_a = 25 \pm 2\text{ }^{\circ}\text{C}$ ,  $f_v = 120\text{ Hz}$ , whereas a power dissipation check pattern below is displayed.

a. White Pattern



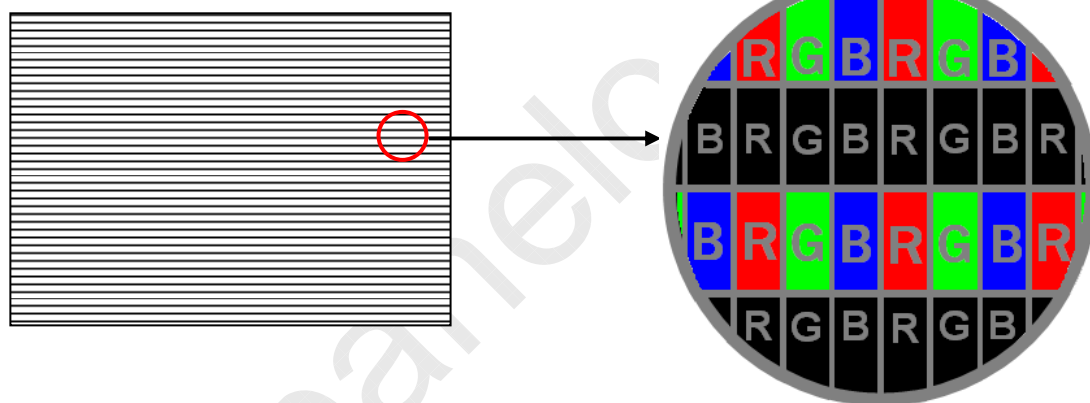
Active Area

b. Black Pattern

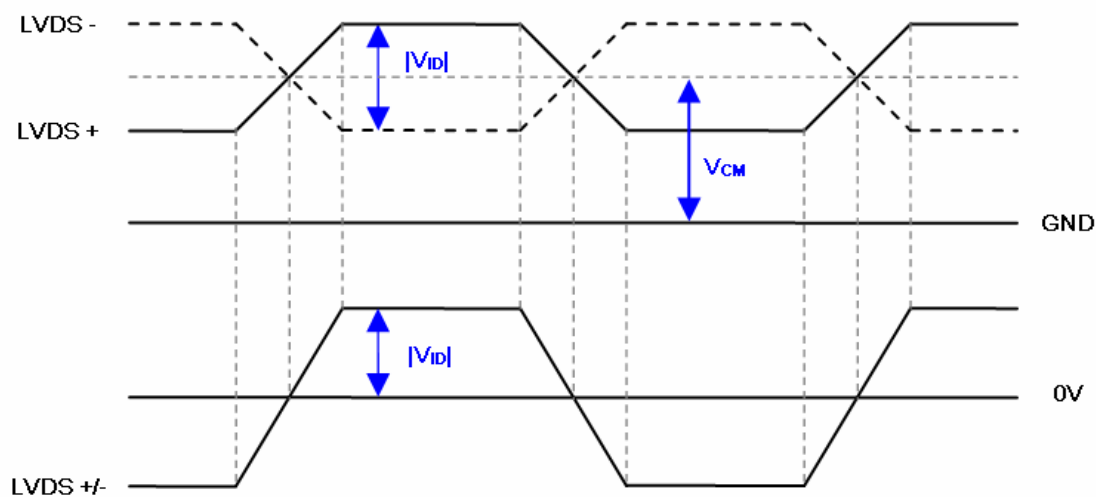


Active Area

c. Horizontal Stripe Pattern



Note (4) The LVDS input characteristics are as follows:



## 3.2 BACKLIGHT CONNECTOR PIN CONFIGURATION

### 3.2.1 LED LIGHT BAR CHARACTERISTICS

A. 2D/3D=Low level or Open (negative dimming)

(Ta = 25 ± 2 °C)

| Parameter         | Symbol          | Value  |       |       | Unit | Note                                       |
|-------------------|-----------------|--------|-------|-------|------|--------------------------------------------|
|                   |                 | Min.   | Typ.  | Max.  |      |                                            |
| Light Bar Voltage | V <sub>W</sub>  | 33.6   | 38.4  | 42    | V    | (1),<br>Duty=0%,<br>I <sub>PIN</sub> =60mA |
| LED Current       | I <sub>L</sub>  | 58.2   | 60    | 61.8  | mA   | (1), (2)<br>Duty=0%                        |
| Power consumption | P <sub>BL</sub> | ---    | 13.83 | 15.57 | W    | (1)<br>Duty=0%,<br>I <sub>PIN</sub> =60mA  |
| Life time         | -               | 30,000 | -     | -     | Hrs  | (3)                                        |

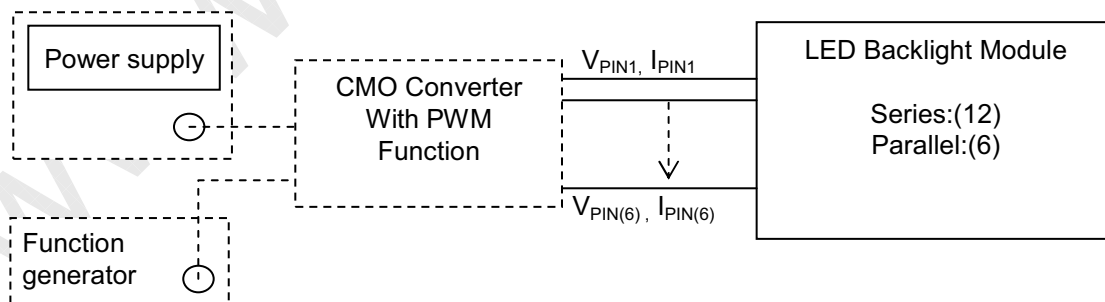
B. 2D/3D=High level (negative dimming, reference only)

| Parameter         | Symbol          | Value |      |      | Unit | Note                                        |
|-------------------|-----------------|-------|------|------|------|---------------------------------------------|
|                   |                 | Min.  | Typ. | Max. |      |                                             |
| Light Bar Voltage | V <sub>W</sub>  | ---   | 46.8 | 50.4 | V    | (1),<br>Duty=0%,<br>I <sub>PIN</sub> =120mA |
| LED Current       | I <sub>L</sub>  | ---   | 120  | 125  | mA   | (1), (2)<br>Duty=82% 120Hz                  |
| Power consumption | P <sub>BL</sub> | ---   | 6.1  | 6.8  | W    | (1)<br>Duty=82%,<br>I <sub>PIN</sub> =120mA |

Note (1)LED light bar input voltage and current are measured by utilizing a true RMS multimeter as shown below:

Note (2)  $P_{BL} = I_{PIN} \times V_{PIN} \times (6)$  input pins , LED light bar circuit is (12)Series, (6)Parallel.

Note (3)The lifetime of LED is defined as the time when LED packages continue to operate under the conditions at Ta = 25 ±2 °C and I= (20)mA (per chip) until the brightness becomes ≤ 50% of its original value.





## 3.2.2 LIGHTBAR CONNECTOR PIN ASSIGNMENT

Connector: B-F,7083K-F12N-00L ,ENTERY(恩得利),

161035-12041-3 P-TWO (禾昌), GB5DH120-112M-7H,Foxconn(鴻海), or Compatible

(1) Input connector pin assignment: CN1

| Pin No. | Symbol       | Feature                                 |
|---------|--------------|-----------------------------------------|
| 1       | NC           | Not connection, this pin should be open |
| 2       | LED1         | Cathode of LED string                   |
| 3       | LED2         | Cathode of LED string                   |
| 4       | LED3         | Cathode of LED string                   |
| 5       | NC           | Not connection, this pin should be open |
| 6       | VLED (38.4V) | VLED                                    |
| 7       | VLED (38.4V) | VLED                                    |
| 8       | NC           | Not connection, this pin should be open |
| 9       | LED4         | Cathode of LED string                   |
| 10      | LED5         | Cathode of LED string                   |
| 11      | LED6         | Cathode of LED string                   |
| 12      | NC           | Not connection, this pin should be open |

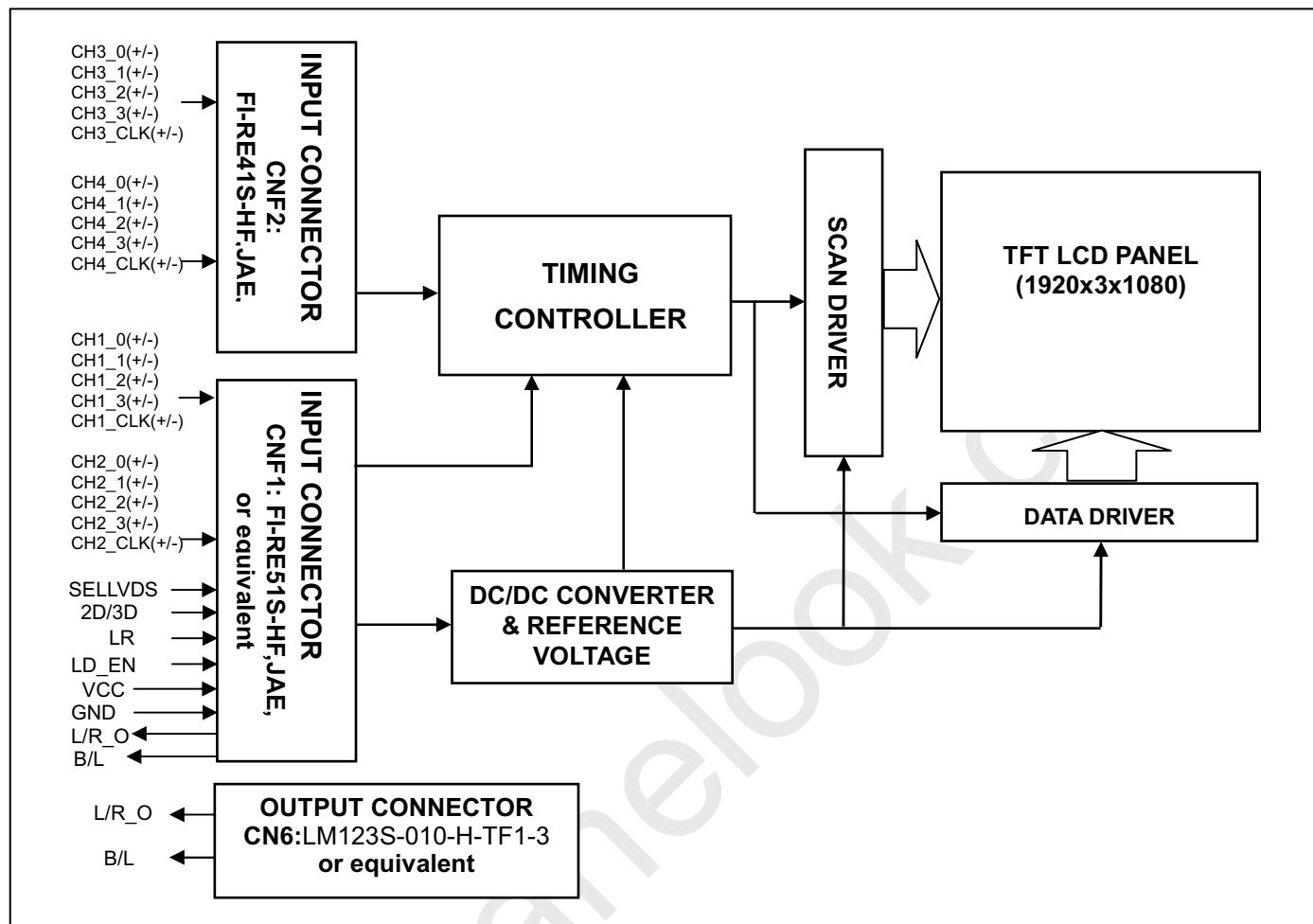
## 3.3 LVDS INPUT SIGNAL SPECIFICATIONS

### 3.3.1 LVDS DATA MAPPING TABLE

|                 |             |     |     |     |     |     |     |     |
|-----------------|-------------|-----|-----|-----|-----|-----|-----|-----|
| LVDS Channel O0 | LVDS output | D7  | D6  | D4  | D3  | D2  | D1  | D0  |
|                 | Data order  | OG0 | OR5 | OR4 | OR3 | OR2 | OR1 | OR0 |
| LVDS Channel O1 | LVDS output | D18 | D15 | D14 | D13 | D12 | D9  | D8  |
|                 | Data order  | OB1 | OB0 | OG5 | OG4 | OG3 | OG2 | OG1 |
| LVDS Channel O2 | LVDS output | D26 | D25 | D24 | D22 | D21 | D20 | D19 |
|                 | Data order  | DE  | NA  | NA  | OB5 | OB4 | OB3 | OB2 |
| LVDS Channel O3 | LVDS output | D23 | D17 | D16 | D11 | D10 | D5  | D27 |
|                 | Data order  | NA  | OB7 | OB6 | OG7 | OG6 | OR7 | OR6 |
| LVDS Channel E0 | LVDS output | D7  | D6  | D4  | D3  | D2  | D1  | D0  |
|                 | Data order  | EG0 | ER5 | ER4 | ER3 | ER2 | ER1 | ER0 |
| LVDS Channel E1 | LVDS output | D18 | D15 | D14 | D13 | D12 | D9  | D8  |
|                 | Data order  | EB1 | EB0 | EG5 | EG4 | EG3 | EG2 | EG1 |
| LVDS Channel E2 | LVDS output | D26 | D25 | D24 | D22 | D21 | D20 | D19 |
|                 | Data order  | DE  | NA  | NA  | EB5 | EB4 | EB3 | EB2 |
| LVDS Channel E3 | LVDS output | D23 | D17 | D16 | D11 | D10 | D5  | D27 |
|                 | Data order  | NA  | EB7 | EB6 | EG7 | EG6 | ER7 | ER6 |

## 4. BLOCK DIAGRAM OF INTERFACE

### 4.1 TFT LCD MODULE



## 5. INPUT TERMINAL PIN ASSIGNMENT

### 5.1 TFT LCD MODULE INPUT

CNF1 Connector Pin Assignment: (FI-RE51S-HF(JAE) or equivalent)

| Pin | Name    | Description                                                | Note              |
|-----|---------|------------------------------------------------------------|-------------------|
| 1   | N.C.    | No Connection                                              | (1)               |
| 2   | N.C.    | No Connection                                              |                   |
| 3   | N.C.    | No Connection                                              |                   |
| 4   | N.C.    | No Connection                                              |                   |
| 5   | L/R_O   | Output signal for Left Right Glasses control               | (7)               |
| 6   | B/L     | Backlight on/off control signal , H: B/L off, L: B/L on    | H: +3.3V<br>L: 0V |
| 7   | SELLVDS | LVDS Data Format Selection                                 | (2)(6)            |
| 8   | N.C.    | No Connection                                              | (1)               |
| 9   | N.C.    | No Connection                                              |                   |
| 10  | N.C.    | No Connection                                              |                   |
| 11  | GND     | Ground                                                     |                   |
| 12  | CH1[0]- | First pixel Negative LVDS differential data input. Pair 0  |                   |
| 13  | CH1[0]+ | First pixel Positive LVDS differential data input. Pair 0  |                   |
| 14  | CH1[1]- | First pixel Negative LVDS differential data input. Pair 1  |                   |
| 15  | CH1[1]+ | First pixel Positive LVDS differential data input. Pair 1  |                   |
| 16  | CH1[2]- | First pixel Negative LVDS differential data input. Pair 2  |                   |
| 17  | CH1[2]+ | First pixel Positive LVDS differential data input. Pair 2  |                   |
| 18  | GND     | Ground                                                     |                   |
| 19  | CH1CLK- | First pixel Negative LVDS differential clock input.        |                   |
| 20  | CH1CLK+ | First pixel Positive LVDS differential clock input.        |                   |
| 21  | GND     | Ground                                                     |                   |
| 22  | CH1[3]- | First pixel Negative LVDS differential data input. Pair 3  |                   |
| 23  | CH1[3]+ | First pixel Positive LVDS differential data input. Pair 3  |                   |
| 24  | N.C.    | No Connection                                              |                   |
| 25  | N.C.    | No Connection                                              |                   |
| 26  | 2D/3D   | Input signal for 2D/3D Mode Selection                      | (3)(5)            |
| 27  | LR      | Input signal for Left Right eye frame synchronous          | (4)(5)            |
| 28  | CH2[0]- | Second pixel Negative LVDS differential data input. Pair 0 |                   |

|    |         |                                                            |     |
|----|---------|------------------------------------------------------------|-----|
| 29 | CH2[0]+ | Second pixel Positive LVDS differential data input. Pair 0 |     |
| 30 | CH2[1]- | Second pixel Negative LVDS differential data input. Pair 1 |     |
| 31 | CH2[1]+ | Second pixel Positive LVDS differential data input. Pair 1 |     |
| 32 | CH2[2]- | Second pixel Negative LVDS differential data input. Pair 2 |     |
| 33 | CH2[2]+ | Second pixel Positive LVDS differential data input. Pair 2 |     |
| 34 | GND     | Ground                                                     |     |
| 35 | CH2CLK- | Second pixel Negative LVDS differential clock input.       |     |
| 36 | CH2CLK+ | Second pixel Positive LVDS differential clock input.       |     |
| 37 | GND     | Ground                                                     |     |
| 38 | CH2[3]- | Second pixel Negative LVDS differential data input. Pair 3 |     |
| 39 | CH2[3]+ | Second pixel Positive LVDS differential data input. Pair 3 |     |
| 40 | N.C.    | No Connection                                              |     |
| 41 | N.C.    | No Connection                                              |     |
| 42 | NC      | No Connection                                              |     |
| 43 | N.C.    | No Connection                                              | (1) |
| 44 | GND     | Ground                                                     |     |
| 45 | GND     | Ground                                                     |     |
| 46 | GND     | Ground                                                     |     |
| 47 | N.C.    | No Connection                                              | (1) |
| 48 | VCC     | +12V power supply                                          |     |
| 49 | VCC     | +12V power supply                                          |     |
| 50 | VCC     | +12V power supply                                          |     |
| 51 | VCC     | +12V power supply                                          |     |



CNF2 Connector Pin Assignment (FI-RE41S-HF (JAE) or equivalent)

| Pin | Name    | Description                                                | Note |
|-----|---------|------------------------------------------------------------|------|
| 1   | N.C.    | No Connection                                              | (1)  |
| 2   | N.C.    | No Connection                                              |      |
| 3   | N.C.    | No Connection                                              |      |
| 4   | N.C.    | No Connection                                              |      |
| 5   | N.C.    | No Connection                                              |      |
| 6   | N.C.    | No Connection                                              |      |
| 7   | N.C.    | No Connection                                              |      |
| 8   | N.C.    | No Connection                                              |      |
| 9   | GND     | Ground                                                     |      |
| 10  | CH3[0]- | Third pixel Negative LVDS differential data input. Pair 0  |      |
| 11  | CH3[0]+ | Third pixel Positive LVDS differential data input. Pair 0  |      |
| 12  | CH3[1]- | Third pixel Negative LVDS differential data input. Pair 1  |      |
| 13  | CH3[1]+ | Third pixel Positive LVDS differential data input. Pair 1  |      |
| 14  | CH3[2]- | Third pixel Negative LVDS differential data input. Pair 2  |      |
| 15  | CH3[2]+ | Third pixel Positive LVDS differential data input. Pair 2  |      |
| 16  | GND     | Ground                                                     |      |
| 17  | CH3CLK- | Third pixel Negative LVDS differential clock input.        |      |
| 18  | CH3CLK+ | Third pixel Positive LVDS differential clock input.        |      |
| 19  | GND     | Ground                                                     |      |
| 20  | CH3[3]- | Third pixel Negative LVDS differential data input. Pair 3  |      |
| 21  | CH3[3]+ | Third pixel Positive LVDS differential data input. Pair 3  |      |
| 22  | N.C.    | No Connection                                              |      |
| 23  | N.C.    | No Connection                                              |      |
| 24  | GND     | Ground                                                     |      |
| 25  | GND     | Ground                                                     |      |
| 26  | CH4[0]- | Fourth pixel Negative LVDS differential data input. Pair 0 |      |
| 27  | CH4[0]+ | Fourth pixel Positive LVDS differential data input. Pair 0 |      |
| 28  | CH4[1]- | Fourth pixel Negative LVDS differential data input. Pair 1 |      |
| 29  | CH4[1]+ | Fourth pixel Positive LVDS differential data input. Pair 1 |      |
| 30  | CH4[2]- | Fourth pixel Negative LVDS differential data input. Pair 2 |      |



|    |         |                                                            |  |
|----|---------|------------------------------------------------------------|--|
| 31 | CH4[2]+ | Fourth pixel Positive LVDS differential data input. Pair 2 |  |
| 32 | GND     | Ground                                                     |  |
| 33 | CH4CLK- | Fourth pixel Negative LVDS differential clock input.       |  |
| 34 | CH4CLK+ | Fourth pixel Positive LVDS differential clock input.       |  |
| 35 | GND     | Ground                                                     |  |
| 36 | CH4[3]- | Fourth pixel Negative LVDS differential data input. Pair 3 |  |
| 37 | CH4[3]+ | Fourth pixel Positive LVDS differential data input. Pair 3 |  |
| 38 | N.C.    | No Connection                                              |  |
| 39 | N.C.    | No Connection                                              |  |
| 40 | GND     | Ground                                                     |  |
| 41 | GND     | Ground                                                     |  |

CN6 Connector Pin Assignment (LM123S-010-H-TF1-3 (UNE) or equivalent)

|    |       |                                                         |                   |
|----|-------|---------------------------------------------------------|-------------------|
| 1  | N.C.  | No Connection                                           |                   |
| 2  | N.C.  | No Connection                                           |                   |
| 3  | N.C.  | No Connection                                           |                   |
| 4  | GND   | Ground                                                  |                   |
| 5  | B/L   | Backlight on/off control signal , H: B/L off, L: B/L on | H: +3.3V<br>L: 0V |
| 6  | L/R_O | Output signal for Left Right Glasses control            | (7)               |
| 7  | N.C.  | No Connection                                           |                   |
| 8  | N.C.  | No Connection                                           |                   |
| 9  | N.C.  | No Connection                                           |                   |
| 10 | N.C.  | No Connection                                           |                   |

Note (1) Reserved for internal use. Please leave it open.

Note (2) LVDS format selection.

L= Connect to GND , H=Connect to +3.3V or Open

| SELLVDS   | Note         |
|-----------|--------------|
| L         | JEDIA Format |
| H or Open | VESA Format  |

Note (3) 2D/3D mode selection.

L= Connect to GND or Open, H=Connect to +3.3V

| 2D/3D     | Note    |
|-----------|---------|
| L or Open | 2D Mode |

|   |         |
|---|---------|
| H | 3D Mode |
|---|---------|

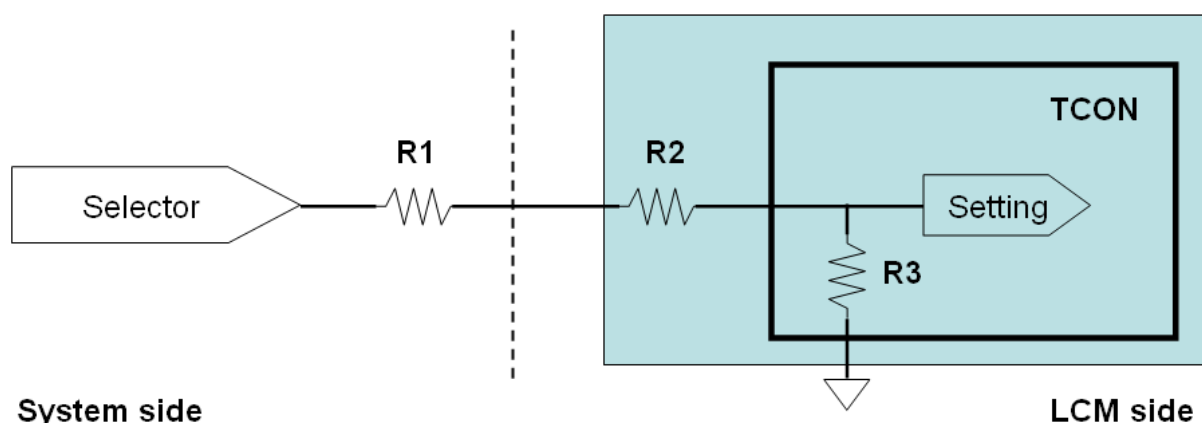
Note (4) Left Right synchronous signal for glasses.

$V_{IL}=0\sim 0.8\text{ V}$ ,  $V_{IH}=2.0\sim 3.3\text{ V}$

| LR | Note                     |
|----|--------------------------|
| L  | Right synchronous signal |
| H  | Left synchronous signal  |

Note (5) 2D/3D, and LR signal pin connected to the LCM side has the following diagram.

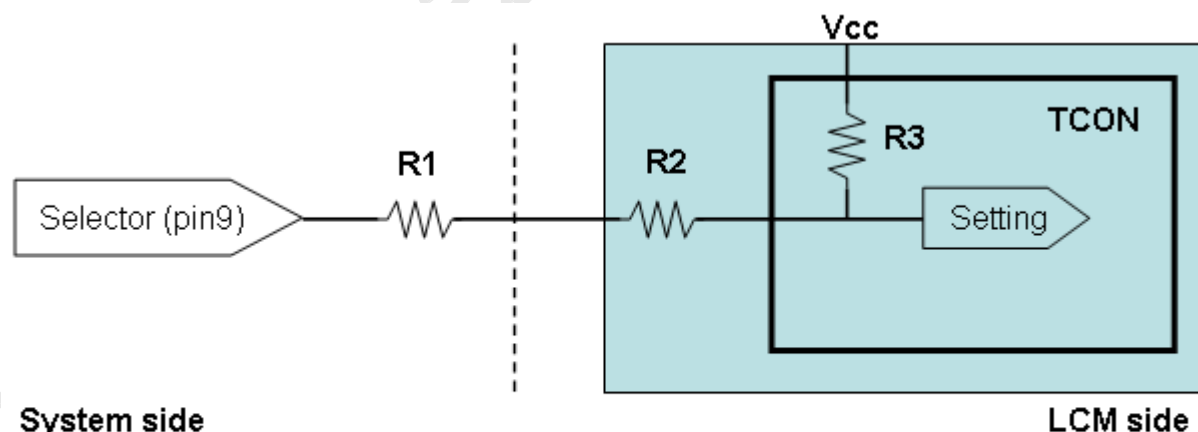
R1 in the system side should be less than 1K Ohm. ( $R1 < 1\text{K Ohm}$ )



System side:  $R1 < 1\text{K}$

Note (6) SELLVDS signal pin connected to the LCM side has the following diagram.

R1 in the system side should be less than 1K Ohm. ( $R1 < 1\text{K Ohm}$ )



System side  
 $R1 < 1\text{K}$



Note (7) The definition of L/R signal as follows

L= 0V , H= +3.3V

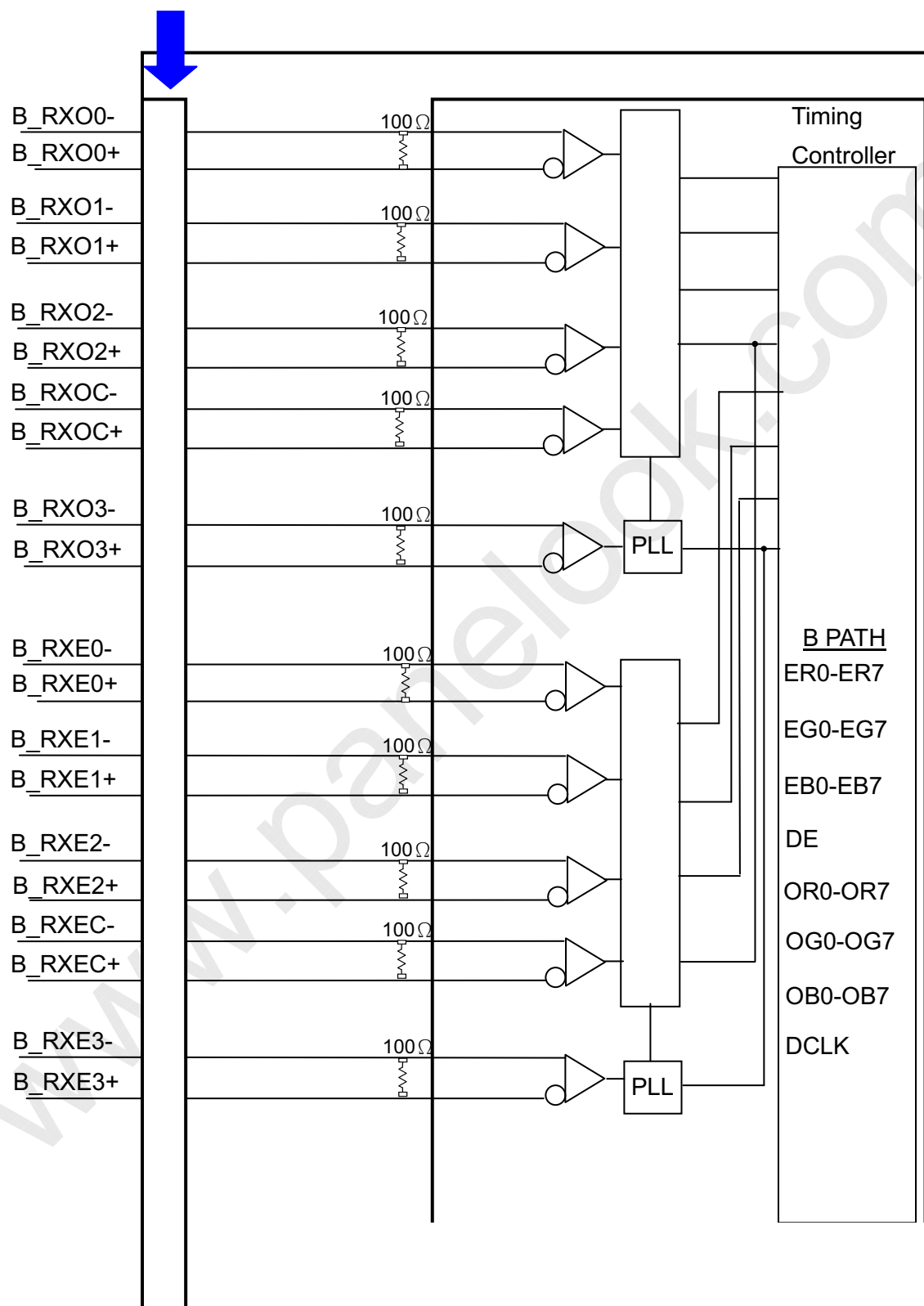
| L/R | Note                |
|-----|---------------------|
| L   | Right glass turn on |
| H   | Left glass turn on  |

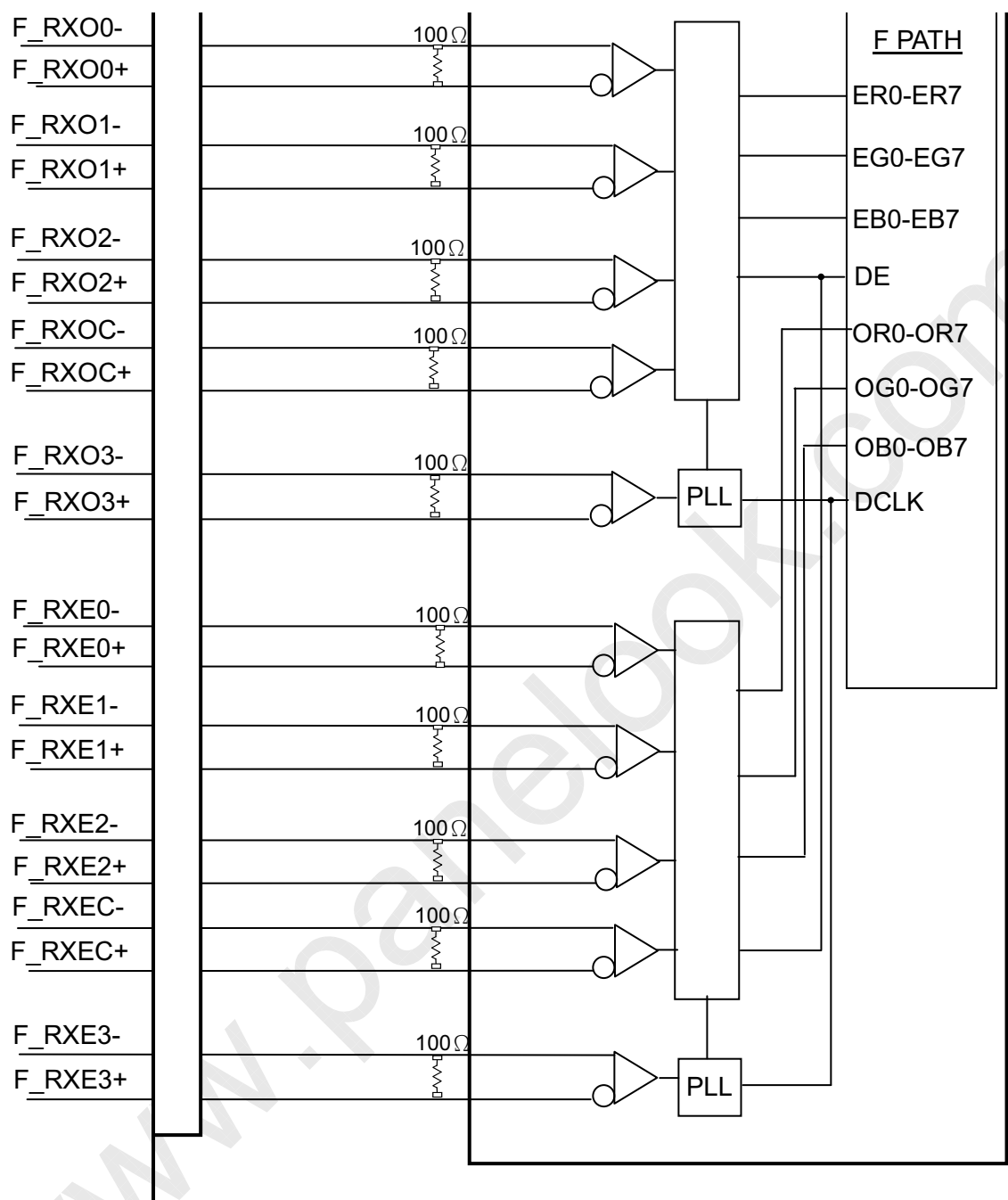
Note (8) LVDS 4-port Data Mapping

| Port     | Channel of LVDS | Data Stream              |
|----------|-----------------|--------------------------|
| 1st Port | First Pixel     | 1, 5, 9, .....1913, 1917 |
| 2nd Port | Second Pixel    | 2, 6, 10, ....1914, 1918 |
| 3rd Port | Third Pixel     | 3, 7, 11, ....1915, 1919 |
| 4th Port | Fourth Pixel    | 4, 8, 12, ....1916, 1920 |

## 5.3 BLOCK DIAGRAM OF INTERFACE

TFT LCD Module Input





|         |                   |         |                    |
|---------|-------------------|---------|--------------------|
| ER0~ER7 | Even pixel R data | OR0~OR7 | Odd pixel R data   |
| EG0~EG7 | Even pixel G data | OG0~OG7 | Odd pixel G data   |
| EB0~EB7 | Even pixel B data | OB0~OB7 | Odd pixel B data   |
|         |                   | DE      | Data enable signal |
|         |                   | DCLK    | Data clock signal  |

Note (1) The system must have the transmitter to drive the module.

Note (2) LVDS cable impedance shall be 50 ohms per signal line or about 100 ohms per twist-pair line when it is used differentially.

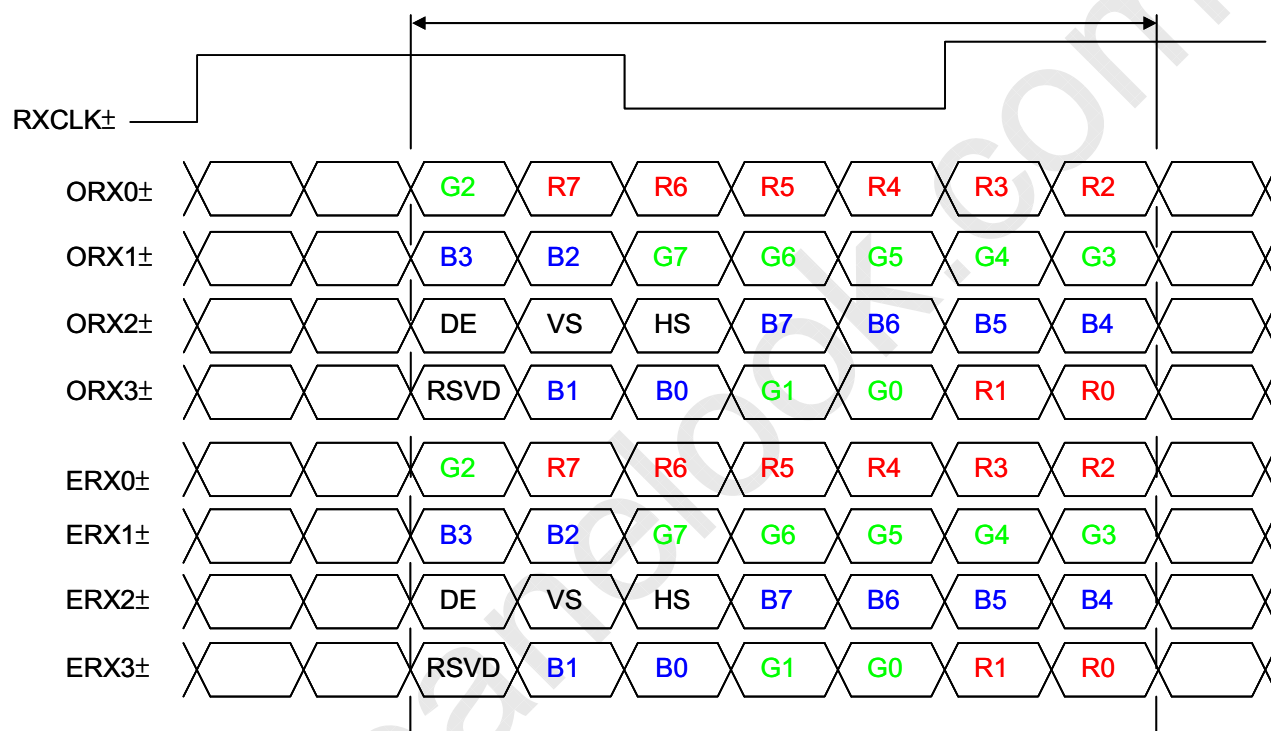
Note (3) Two pixel data send into the module for every clock cycle. The first pixel of the frame is odd pixel and the second pixel is even pixel.

## 5.4 LVDS INTERFACE

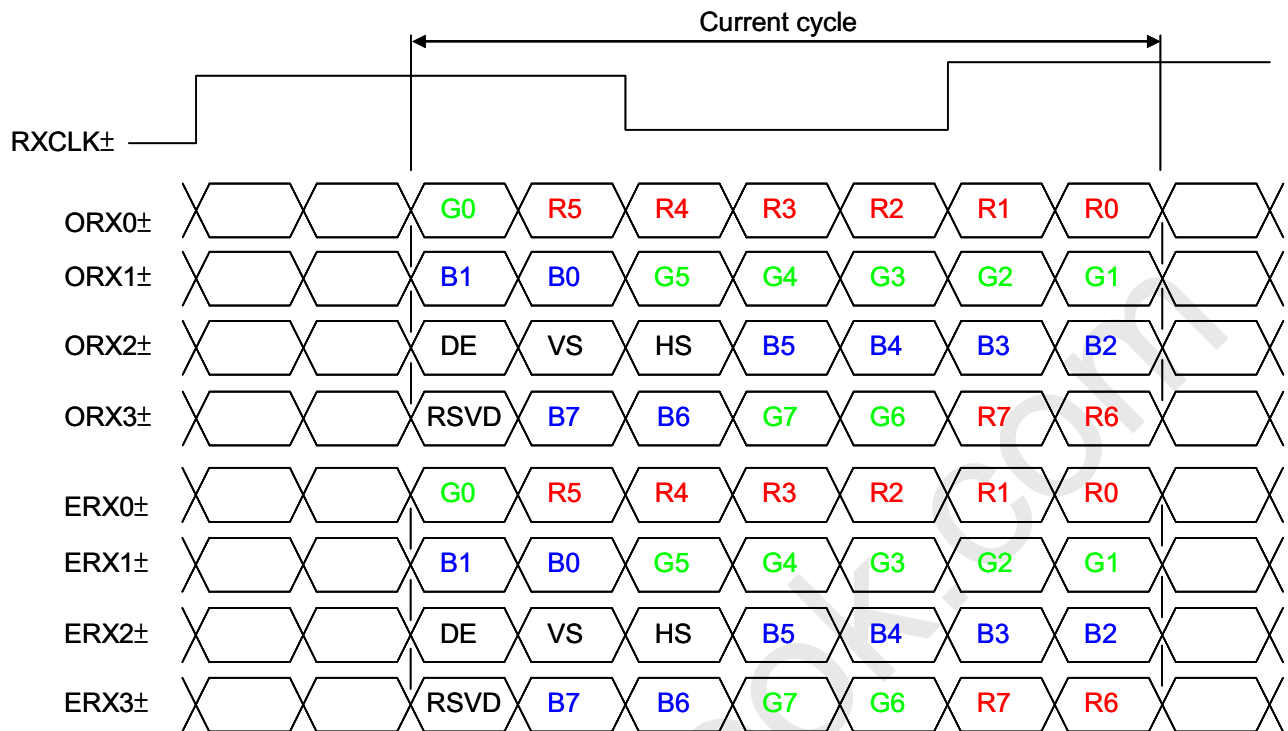
JEIDA Format : SELLVDS = L

VESA Format : SELLVDS = H or Open

JEDIA Format



## VESA Format



R0~R7: Pixel R Data (7; MSB, 0; LSB)

G0~G7: Pixel G Data (7; MSB, 0; LSB)

B0~B7: Pixel B Data (7; MSB, 0; LSB)

DE : Data enable signal

DCLK : Data clock signal

Notes (1) RSVD (reserved) pins on the transmitter shall be "H" or "L".

## 5.5 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

| Color               |                 | Data Signal |    |    |    |    |    |    |    |       |    |    |    |    |    |    |    |      |    |    |    |    |    |    |    |
|---------------------|-----------------|-------------|----|----|----|----|----|----|----|-------|----|----|----|----|----|----|----|------|----|----|----|----|----|----|----|
|                     |                 | Red         |    |    |    |    |    |    |    | Green |    |    |    |    |    |    |    | Blue |    |    |    |    |    |    |    |
|                     |                 | R7          | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7    | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7   | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
| Basic Colors        | Black           | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Red             | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Green           | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Blue            | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
|                     | Cyan            | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1    | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
|                     | Magenta         | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
|                     | Yellow          | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | White           | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1    | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Gray Scale Of Red   | Red(0) / Dark   | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Red(1)          | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Red(2)          | 0           | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | :               | :           | :  | :  | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  | :  | :  |
|                     | :               | :           | :  | :  | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  | :  | :  |
|                     | Red(253)        | 1           | 1  | 1  | 1  | 1  | 1  | 0  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Red(254)        | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Red(255)        | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Gray Scale Of Green | Green(0) / Dark | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Green(1)        | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Green(2)        | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | :               | :           | :  | :  | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  | :  | :  |
|                     | :               | :           | :  | :  | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  | :  | :  |
|                     | Green(253)      | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 0  | 1  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Green(254)      | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Green(255)      | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Gray Scale Of Blue  | Blue(0) / Dark  | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
|                     | Blue(1)         | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 0  | 1  |
|                     | Blue(2)         | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  | 1  | 0  |
|                     | :               | :           | :  | :  | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  | :  | :  |
|                     | :               | :           | :  | :  | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  | :  | :  |
|                     | Blue(253)       | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1  | 0  | 1  |
|                     | Blue(254)       | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1  | 1  | 0  |
|                     | Blue(255)       | 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1  | 1  | 1  |

Note (1) 0: Low Level Voltage, 1: High Level Voltage



## 6. INTERFACE TIMING

### 6.1 INPUT SIGNAL TIMING SPECIFICATIONS

(Ta = 25 ± 2 °C)

The input signal timing specifications are shown as the following table and timing diagram.

| Signal              | Item                                 | Symbol                     | Min.                   | Typ.  | Max.                   | Unit | Note |
|---------------------|--------------------------------------|----------------------------|------------------------|-------|------------------------|------|------|
| LVDS Receiver Clock | Frequency                            | $F_{\text{clkin}} (=1/TC)$ | 60                     | 74.25 | 96.23                  | MHz  |      |
|                     | Input cycle to cycle jitter          | $T_{\text{rcl}}$           | -                      | -     | 200                    | ps   | (3)  |
|                     | Spread spectrum modulation range     | $F_{\text{clkin\_mod}}$    | $F_{\text{clkin}}-2\%$ | -     | $F_{\text{clkin}}+2\%$ | MHz  | (4)  |
|                     | Spread spectrum modulation frequency | $F_{\text{SSM}}$           | -                      | -     | 200                    | KHz  |      |
| LVDS Receiver Data  | Setup Time                           | $T_{\text{lvsu}}$          | 600                    | -     | -                      | ps   | (5)  |
|                     | Hold Time                            | $T_{\text{lvhd}}$          | 600                    | -     | -                      | ps   |      |

#### 6.1.1 TIMING SPEC FOR FRAME RATE( $F_{\text{rs}} = 100\text{Hz}$ )

|                                |         |         |          |      |      |      |       |                         |
|--------------------------------|---------|---------|----------|------|------|------|-------|-------------------------|
| Vertical Active Display Term   | 2D Mode | Total   | $T_v$    | 1115 | 1125 | 1135 | $T_h$ | $T_v = T_{vd} + T_{vb}$ |
|                                |         | Display | $T_{vd}$ | 1080 | 1080 | 1080 | $T_h$ | —                       |
|                                |         | Blank   | $T_{vb}$ | 35   | 45   | 55   | $T_h$ | —                       |
|                                | 3D Mdoe | Total   | $T_v$    | 1524 |      |      | $T_h$ | (6)                     |
|                                |         | Display | $T_{vd}$ | 1080 |      |      | $T_h$ |                         |
|                                |         | Blank   | $T_{vb}$ | 444  |      |      | $T_h$ |                         |
| Horizontal Active Display Term | 2D Mode | Total   | $T_h$    | 540  | 550  | 575  | $T_c$ | $T_h = T_{hd} + T_{hb}$ |
|                                |         | Display | $T_{hd}$ | 480  | 480  | 480  | $T_c$ | —                       |
|                                |         | Blank   | $T_{hb}$ | 60   | 70   | 95   | $T_c$ | —                       |
|                                | 3D Mdoe | Total   | $T_h$    | 525  |      |      | $T_c$ | (7)                     |
|                                |         | Display | $T_{hd}$ | 480  |      |      | $T_c$ |                         |
|                                |         | Blank   | $T_{hb}$ | 45   |      |      | $T_c$ |                         |

**6.1.2 TIMING SPEC FOR FRAME RATE( $F_{r6} = 120\text{Hz}$ )**

|                                         |         |         |     |      |      |      |    |            |
|-----------------------------------------|---------|---------|-----|------|------|------|----|------------|
| Vertical<br>Active<br>Display<br>Term   | 2D Mode | Total   | Tv  | 1115 | 1125 | 1135 | Th | Tv=Tvd+Tvb |
|                                         |         | Display | Tvd | 1080 | 1080 | 1080 | Th | —          |
|                                         |         | Blank   | Tvb | 35   | 45   | 55   | Th | —          |
|                                         | 3D Mdoe | Total   | Tv  | 1524 |      |      | Th | (6)        |
|                                         |         | Display | Tvd | 1080 |      |      | Th |            |
|                                         |         | Blank   | Tvb | 444  |      |      | Th |            |
| Horizontal<br>Active<br>Display<br>Term | 2D Mode | Total   | Th  | 540  | 550  | 575  | Tc | Th=Thd+Thb |
|                                         |         | Display | Thd | 480  | 480  | 480  | Tc | —          |
|                                         |         | Blank   | Thb | 60   | 70   | 95   | Tc | —          |
|                                         | 3D Mdoe | Total   | Th  | 525  |      |      | Tc | (7)        |
|                                         |         | Display | Thd | 480  |      |      | Tc |            |
|                                         |         | Blank   | Thb | 45   |      |      | Tc |            |

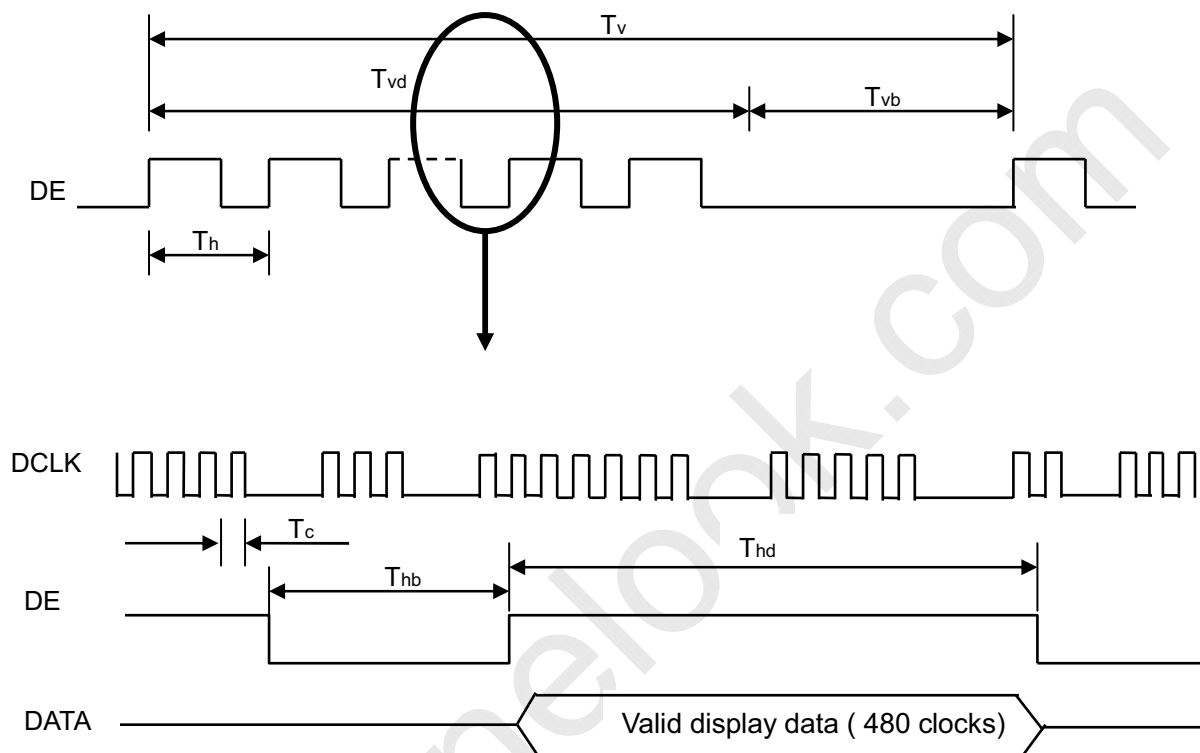
Note (1) Since the module is operated in DE only mode, Hsync and Vsync input signals should be set to low logic level. Otherwise, this module would operate abnormally.

Note (2) Please make sure the range of pixel clock has follow the below equation:

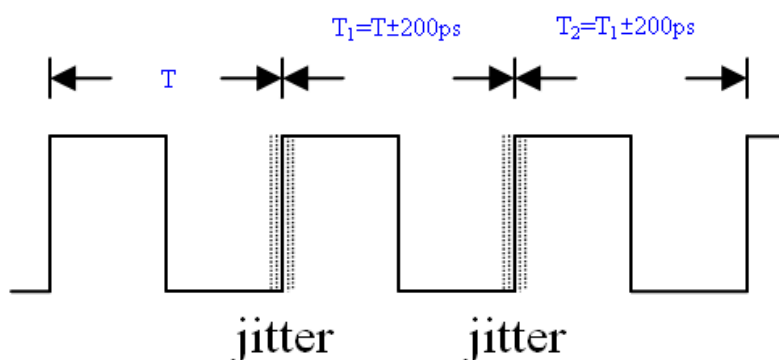
$$F_{clk}(max) \geq F_{r6} \times T_v \times T_h$$

$$F_{r5} \times T_v \times T_h \geq F_{clk}(min)$$

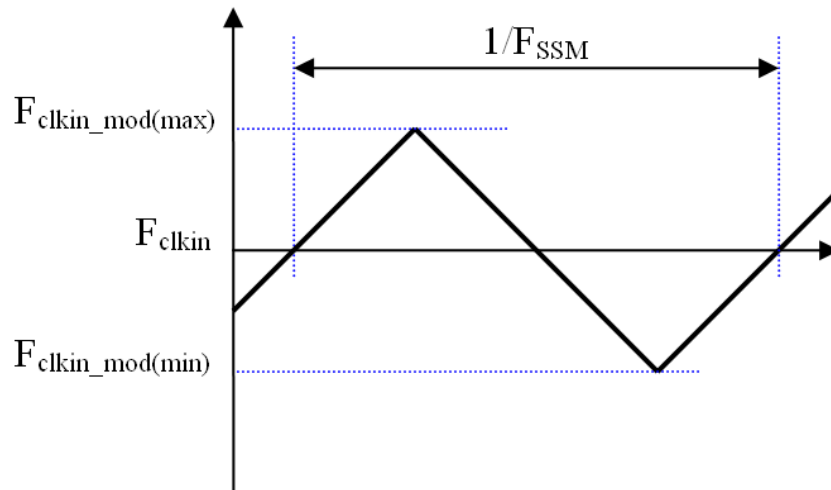
## INPUT SIGNAL TIMING DIAGRAM



Note (3) The input clock cycle-to-cycle jitter is defined as below figures.  $Trcl = |T_1 - T_1|$

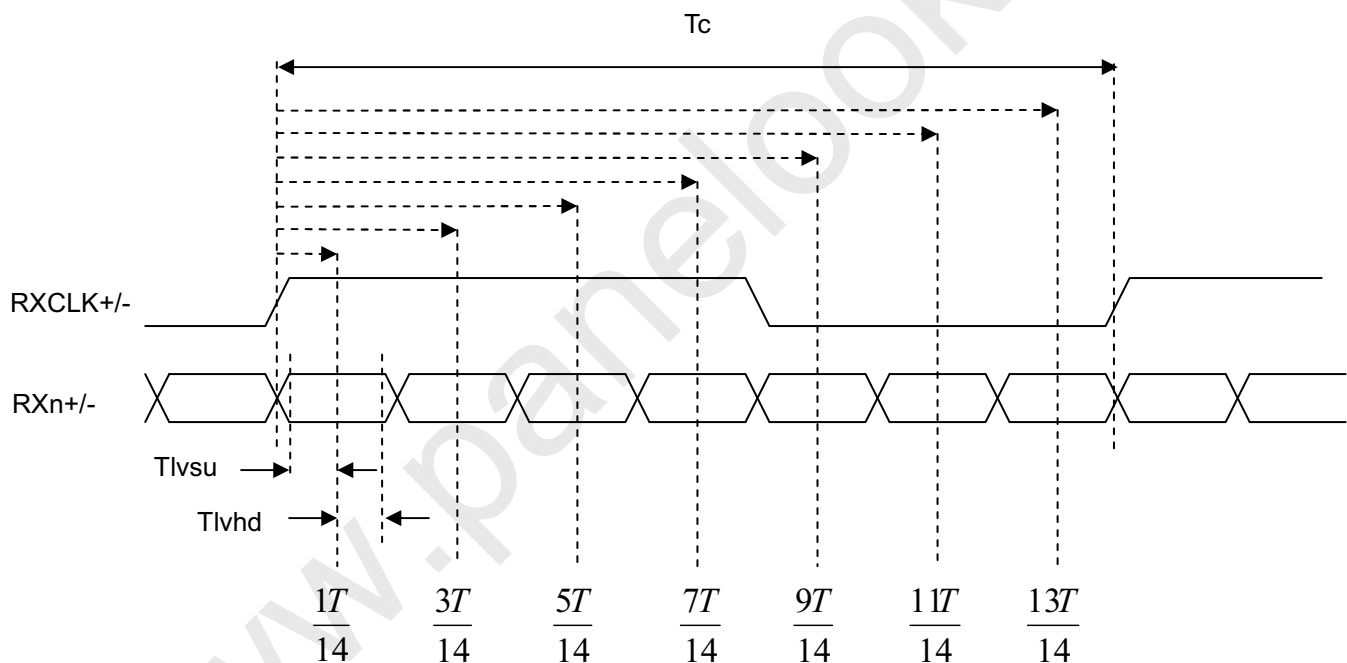


Note (4) The SSCG (Spread spectrum clock generator) is defined as below figures.



Note (5) The LVDS timing diagram and setup/hold time is defined and showing as the following figures.

## LVDS RECEIVER INTERFACE TIMING DIAGRAM



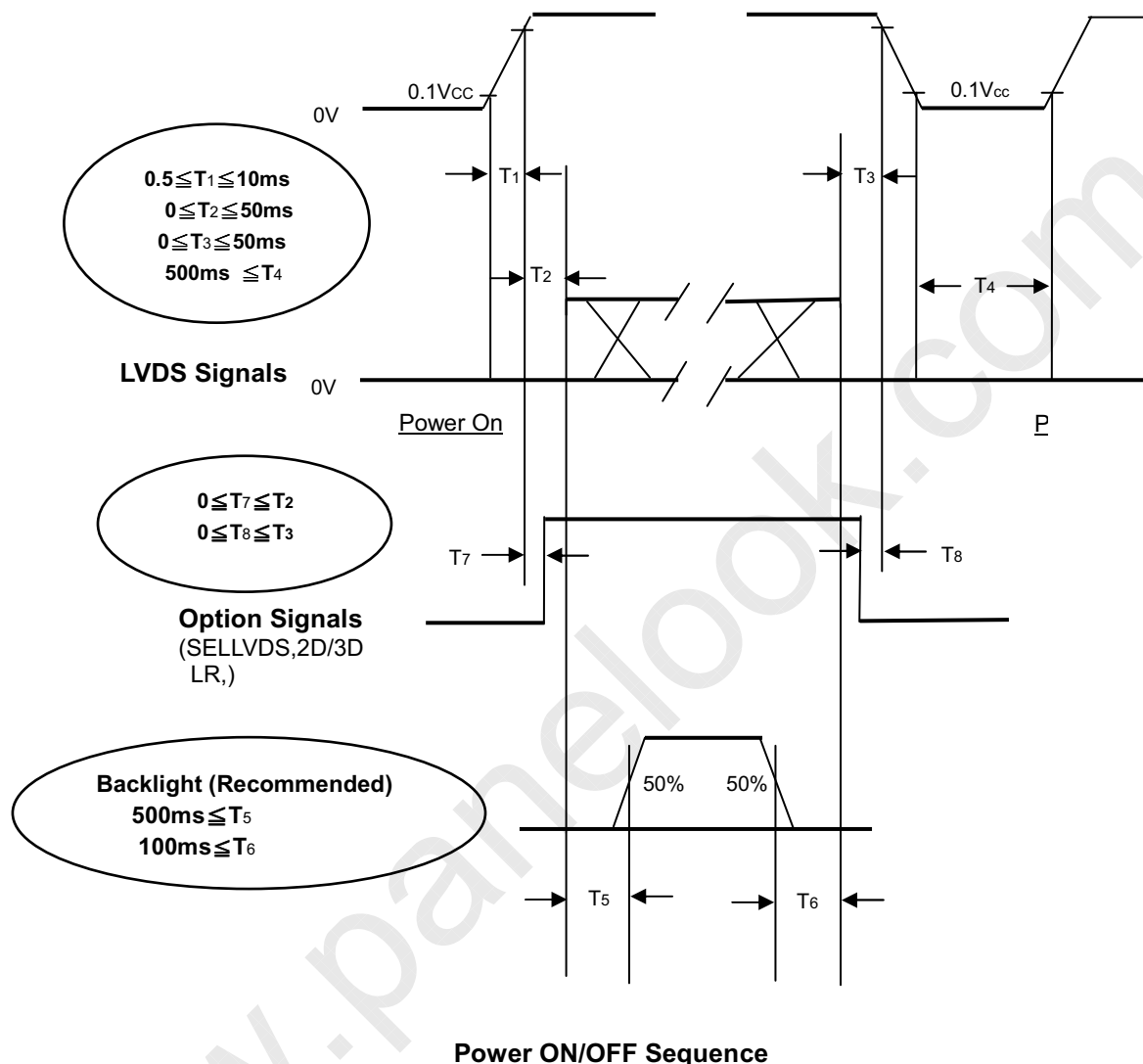
Note (6) Please fix the Vertical timing (Vertical Total =1524 / Display =1080 / Blank = 444) in 3D mode.

Note (7) Please fix the Horizontal timing (Horizontal Total =2100 / Display =1920 / Blank = 180) in 3D mode

## 6.2 POWER ON/OFF SEQUENCE

( $T_a = 25 \pm 2^\circ\text{C}$ )

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should be as the diagram below.



Note (1) The supply voltage of the external system for the module input should follow the definition of Vcc.

Note (2) Apply the LED voltage within the LCD operation range. When the backlight turns on before the LCD operation or the LCD turns off before the backlight turns off, the display may momentarily become abnormal screen.

Note (3) In case of Vcc is in off level, please keep the level of input signals on the low or high impedance. If  $T_2 < 0$ , that maybe cause electrical overstress failure.

Note (4) T4 should be measured after the module has been fully discharged between power off and on period.

Note (5) Interface signal shall not be kept at high impedance when the power is on.

**7. OPTICAL CHARACTERISTICS****7.1 TEST CONDITIONS**

| Item                | Symbol                                                        | Value    | Unit |
|---------------------|---------------------------------------------------------------|----------|------|
| Ambient Temperature | Ta                                                            | 25±2     | oC   |
| Ambient Humidity    | Ha                                                            | 50±10    | %RH  |
| Supply Voltage      | VCC                                                           | 12       | V    |
| Input Signal        | According to typical value in "3. ELECTRICAL CHARACTERISTICS" |          |      |
| LED Current         | IL                                                            | 60 ± 1.2 | mA   |

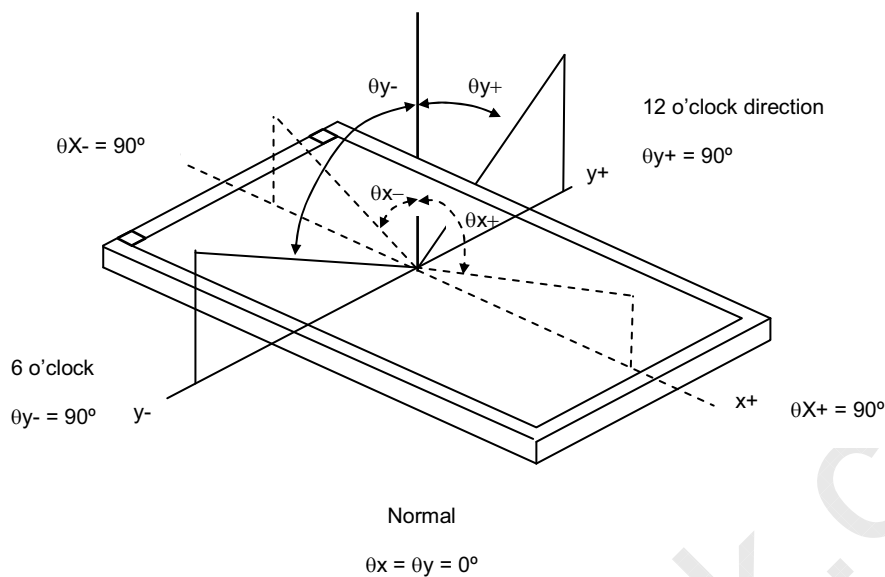
The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 1 hour in a windless room.

## 7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2. The following items should be measured under the test conditions described in 7.1 and stable environment shown in 7.1.

| Item                      |             | Symbol                            | Condition                                                                    | Min.          | Typ.  | Max.          | Unit              | Note     |
|---------------------------|-------------|-----------------------------------|------------------------------------------------------------------------------|---------------|-------|---------------|-------------------|----------|
| Contrast Ratio            |             | CR                                | $\theta_x=0^\circ, \theta_y=0^\circ$<br>Viewing angle<br>at normal direction | 700           | 1000  | -             | -                 | Note (2) |
| Response Time             |             | T <sub>R</sub>                    |                                                                              | -             | 0.8   | 2.5           | ms                | Note (3) |
|                           |             | T <sub>F</sub>                    |                                                                              | -             | 2.8   | 5.5           |                   |          |
| Center Luminance of White |             | LC                                |                                                                              | 250           | 300   | -             | cd/m <sup>2</sup> | Note (5) |
| White Variation           |             | δW                                |                                                                              | -             | -     | 1.33          | -                 | Note (7) |
| Cross Talk                |             | CT                                |                                                                              | -             | -     | 4             | %                 | Note (6) |
| Color Chromaticity        | Red         | R <sub>x</sub>                    |                                                                              | Typ.<br>-0.03 | 0.634 | Typ.<br>+0.03 | -                 | (1)(4)   |
|                           |             | R <sub>y</sub>                    |                                                                              |               | 0.338 |               | -                 |          |
|                           | Green       | G <sub>x</sub>                    |                                                                              |               | 0.306 |               | -                 |          |
|                           |             | G <sub>y</sub>                    |                                                                              |               | 0.619 |               | -                 |          |
|                           | Blue        | B <sub>x</sub>                    |                                                                              |               | 0.155 |               | -                 |          |
|                           |             | B <sub>y</sub>                    |                                                                              |               | 0.056 |               | -                 |          |
|                           | White       | W <sub>x</sub>                    |                                                                              |               | 0.285 |               | -                 |          |
|                           |             | W <sub>y</sub>                    |                                                                              |               | 0.293 |               | -                 |          |
|                           | Color Gamut |                                   |                                                                              | C.G           | -     | 72            | -                 | %        |
| Viewing Angle             | Horizontal  | θ <sub>x+</sub> + θ <sub>x-</sub> | CR ≥ 10<br>USB2000                                                           | 150           | 170   | -             | Deg.              | (1)(4)   |
|                           | Vertical    | θ <sub>y++</sub> θ <sub>y-</sub>  |                                                                              | 140           | 160   | -             |                   |          |
|                           | Horizontal  | θ <sub>x+</sub> + θ <sub>x-</sub> | CR ≥ 5<br>USB2000                                                            | 160           | 178   | -             |                   |          |
|                           | Vertical    | θ <sub>y++</sub> θ <sub>y-</sub>  |                                                                              | 150           | 170   | -             |                   |          |

Note (1) Definition of Viewing Angle ( $\theta_x$ ,  $\theta_y$ ) :



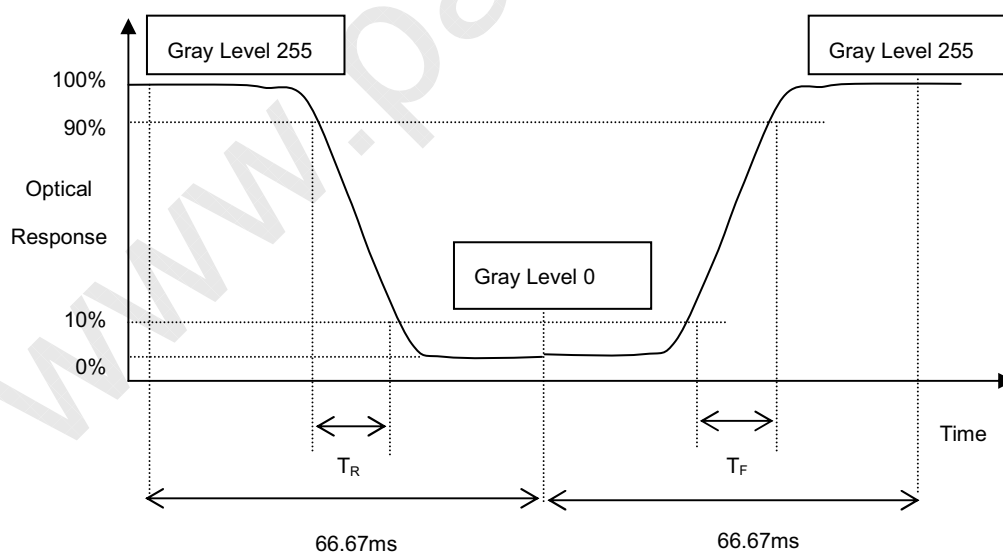
Note (2) Definition of Contrast Ratio (CR) :

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

CR = CR (5), where CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note(6).

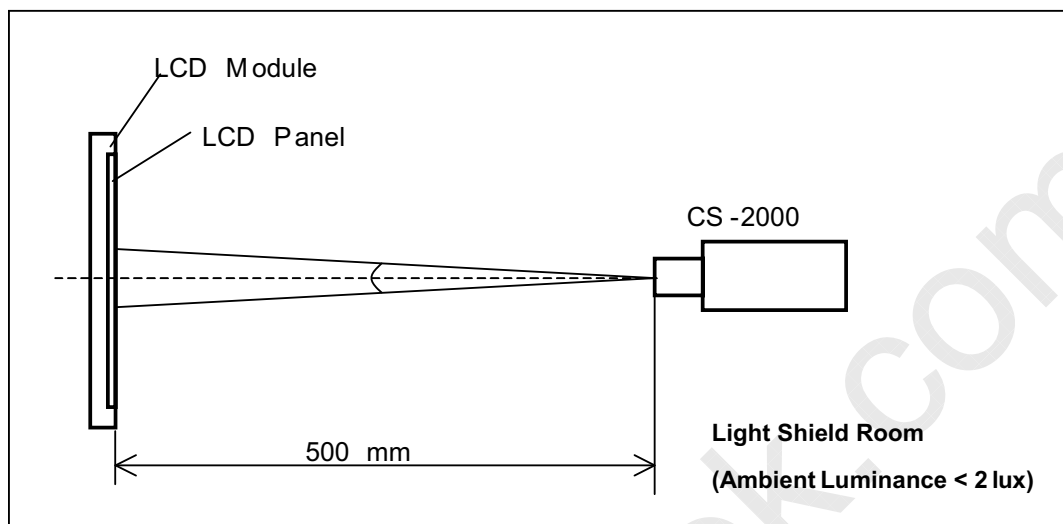
Note (3) Definition of Response Time ( $T_R$ ,  $T_F$ ):





## Note (4) Measurement Setup:

The LCD module should be stabilized at given temperature for 1 hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 1 hour in a windless room.



## Note (5) Definition of Luminance of White ( $L_C$ , $L_{AVE}$ ):

Measure the luminance of gray level 255 at center point and 5 points

$L_C = L(5)$ , where  $L(X)$  is corresponding to the luminance of the point  $X$  at the figure in Note (6).

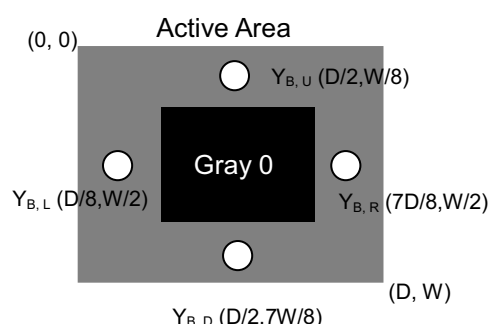
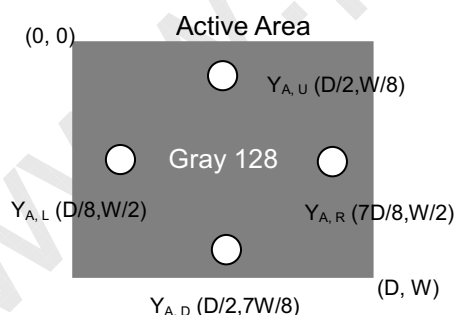
## Note (6) Definition of Cross Talk (CT):

$$CT = |Y_B - Y_A| / Y_A \times 100 (\%)$$

Where:

$Y_A$  = Luminance of measured location without gray level 0 pattern (cd/m<sup>2</sup>)

$Y_B$  = Luminance of measured location with gray level 0 pattern (cd/m<sup>2</sup>)



## Note (7) Definition of White Variation ( $\delta W$ ):

Measure the luminance of gray level 255 at 5 points

$$\delta W = \text{Maximum } [L(1), L(2), L(3), L(4), L(5)] / \text{Minimum } [L(1), L(2), L(3), L(4), L(5)]$$

## 8. PRECAUTIONS

### 8.1 ASSEMBLY AND HANDLING PRECAUTIONS

- [ 1 ] Do not apply rough force such as bending or twisting to the module during assembly.
- [ 2 ] It is recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- [ 3 ] Do not apply pressure or impulse to the module to prevent the damage of LCD panel and Backlight.
- [ 4 ] Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMIS LSI chips.
- [ 5 ] Bezel of Set can not press or touch the panel surface. It will make light leakage or scrape.
- [ 6 ] Do not plug in or pull out the I/F connector while the module is in operation.
- [ 7 ] Do not disassemble the module.
- [ 8 ] Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- [ 9 ] Moisture can easily penetrate into LCD module and may cause the damage during operation.
- [ 10 ] When storing modules as spares for a long time, the following precaution is necessary.
  - [ 10.1 ] Do not leave the module in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35°C at normal humidity without condensation.
  - [ 10.2 ] The module shall be stored in dark place. Do not store the TFT-LCD module in direct sunlight or fluorescent light.
- [ 11 ] When ambient temperature is lower than 10°C, the display quality might be reduced. For example, the response time will become slow, and the starting voltage of CCFL will be higher than that of room temperature.

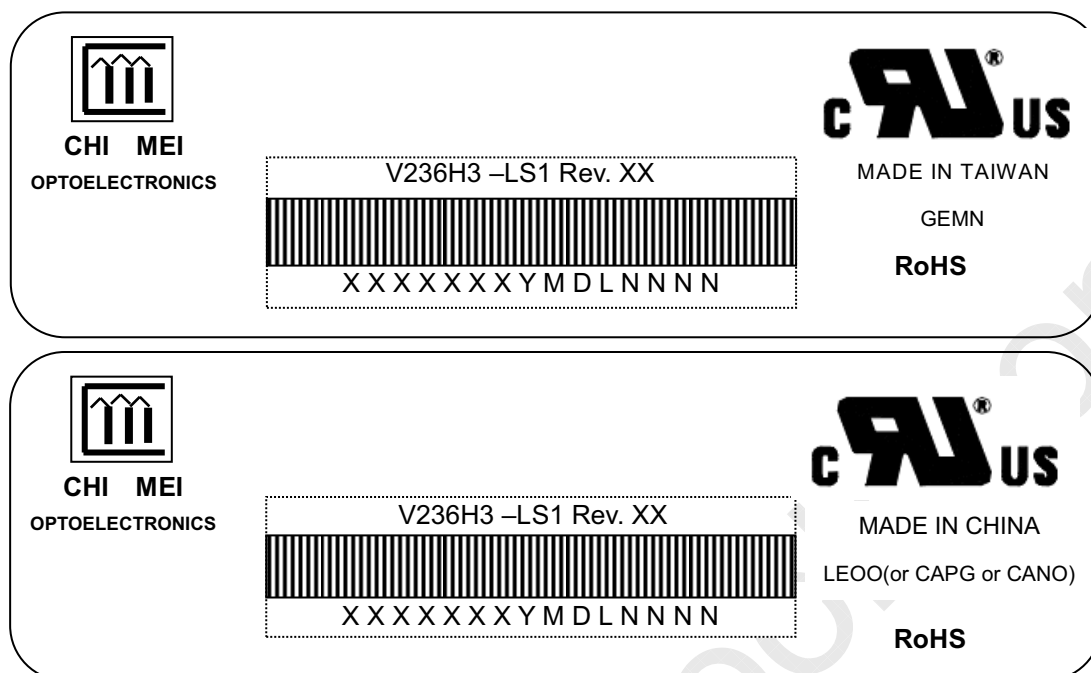
### 8.2 SAFETY PRECAUTIONS

- [ 1 ] The startup voltage of a Backlight is approximately 1000 Volts. It may cause an electrical shock while assembling with the inverter. Do not disassemble the module or insert anything into the Backlight unit.
- [ 2 ] If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- [ 3 ] After the module's end of life, it is not harmful in case of normal operation and storage.

## 9. DEFINITION OF LABELS

### 9.1 CMI MODULE LABEL

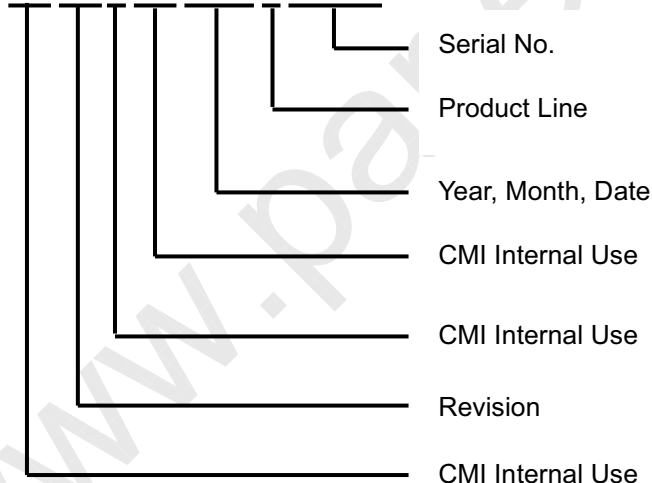
The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.



Model Name: V236H3 -LS1

Revision: Rev. XX, for example: A0, A1... B1, B2... or C1, C2...etc.

Serial ID: X X X X X X Y M D L N N N N



Serial ID includes the information as below:

Manufactured Date:

Year : 2001=1, 2002=2, 2003=3, 2004=4...2010=0, 2011=1, 2012=2...

Month: 1~9, A~C, for Jan. ~ Dec.

Day: 1~9, A~Y, for 1st to 31st, exclude I, O, and U.

Revision Code : Cover all the change

Serial No. : Manufacturing sequence of product

Product Line : 1 → Line1, 2 → Line 2, ...etc.

**10. PACKAGING****10.1 PACKAGING SPECIFICATIONS**

- (1) 10 LCD modules / 1 Box
- (2) Box dimensions: 620(L) X 348 (W) X 430 (H) mm
- (3) Weight: 30kg (10 modules per box)

**10.2 PACKAGING METHOD**

Figures 10-1 and 10-2 are the packing method

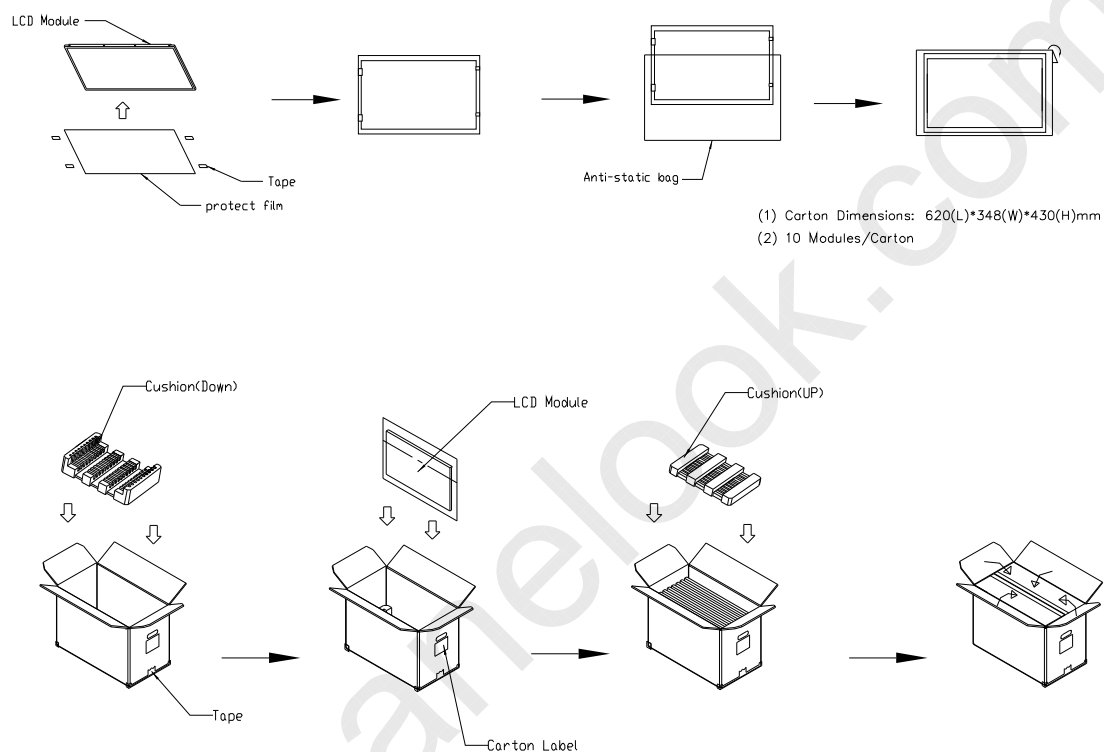


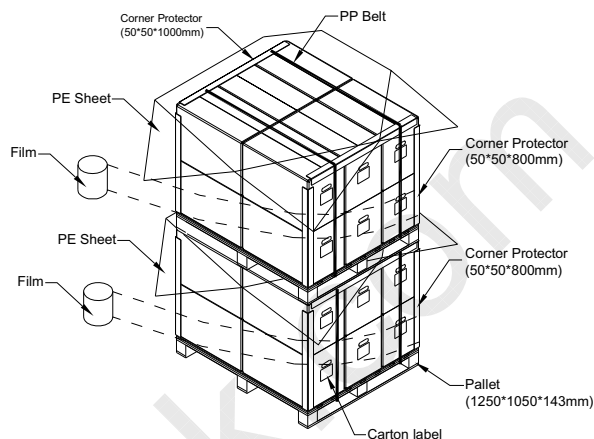
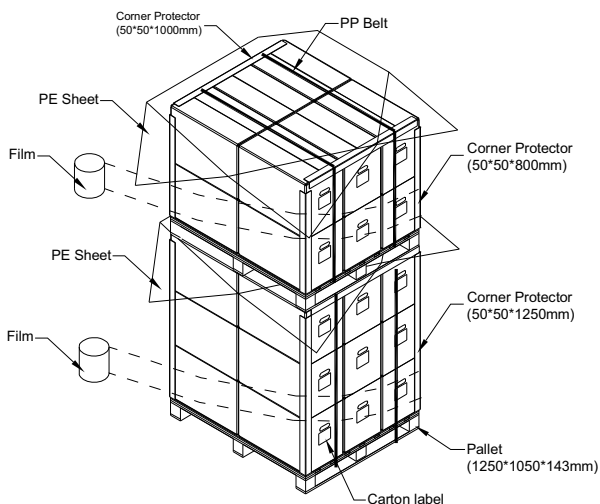
Figure 10-1 packing method



For ocean shipping

Sea / Land Transportation (40ft HQ Container)

Sea / Land Transportation (40ft Container)



For air transport

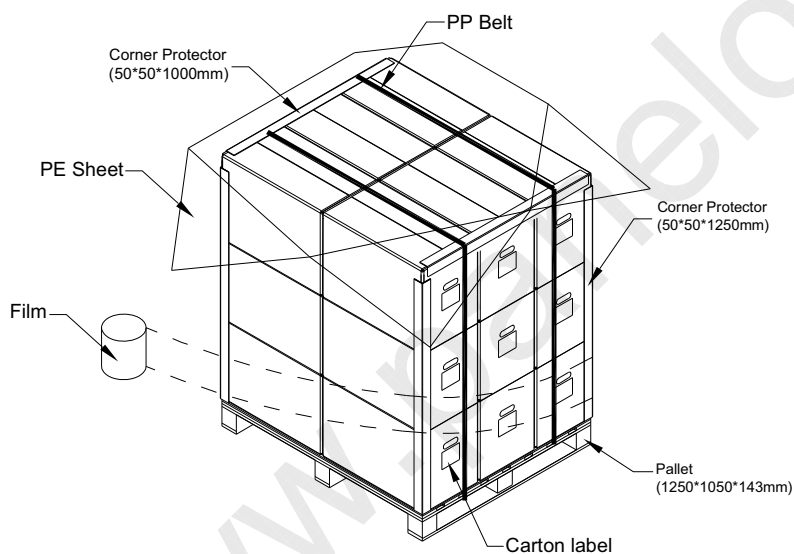
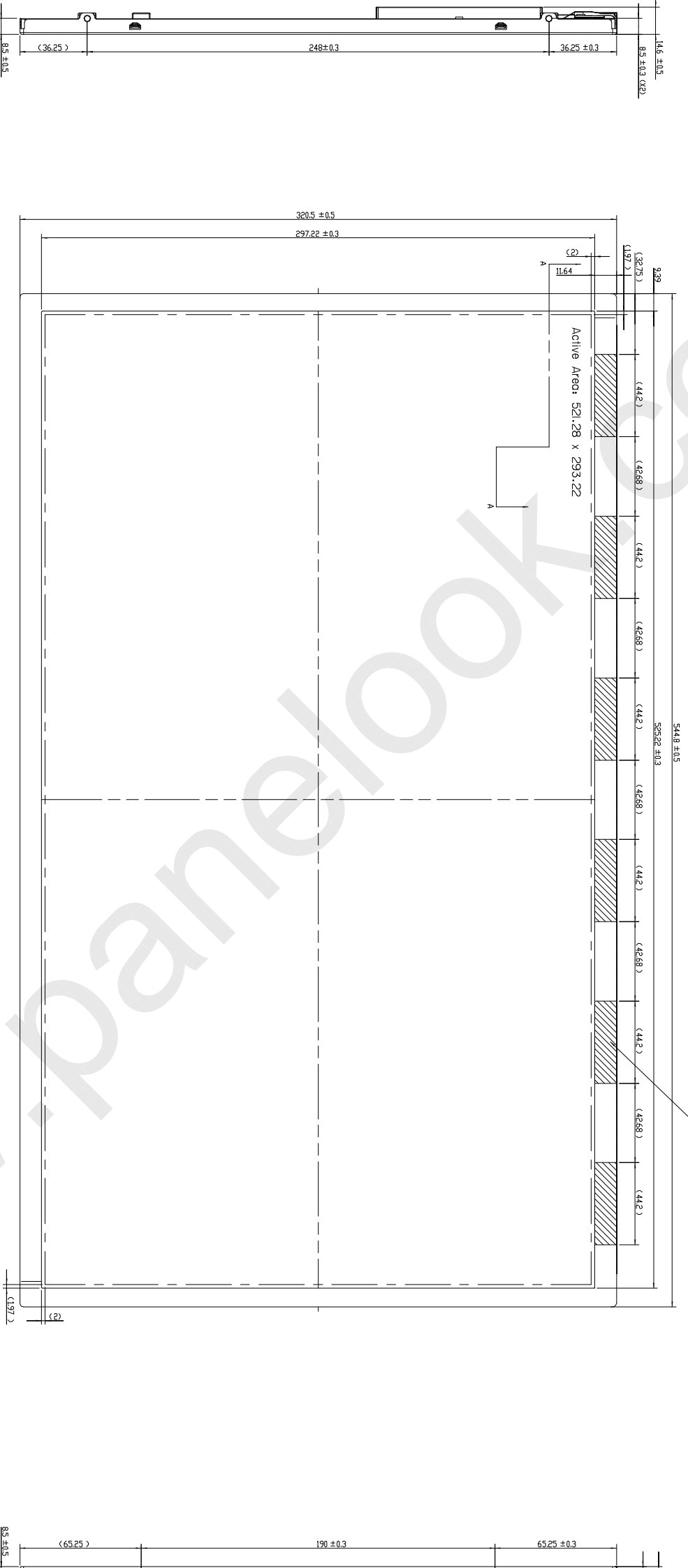


Figure 10-2 packing method

## 11. MECHANICAL CHARACTERISTIC

Data COT Position  
(S) mechanical structure should not touch the positions of Data COT



LIGHT BAR CONNECTOR (22PND)  
Z88X-F12H-01L CENTER? or EQUIVALENT

